

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT) 2

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
2 May 2002 (02.05.2002)

PCT

(10) International Publication Number
WO 02/35469 A2

(51) International Patent Classification⁷: **G06T**

(74) Agent: DULIN, Jacques, M.; Innovation Law Group, Ltd., Suite 101, 851 Fremont Avenue, Los Altos, CA 94024-5602 (US).

(21) International Application Number: PCT/US01/32451

(81) Designated States (national): CA, CN, ID, IN, JP, KR, MX, RU.

(22) International Filing Date: 16 October 2001 (16.10.2001)

(84) Designated States (regional): European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR).

(25) Filing Language: English

Declarations under Rule 4.17:

(26) Publication Language: English

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for all designations
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for all designations

(30) Priority Data:
60/242,039 20 October 2000 (20.10.2000) US
09/924,227 7 August 2001 (07.08.2001) US

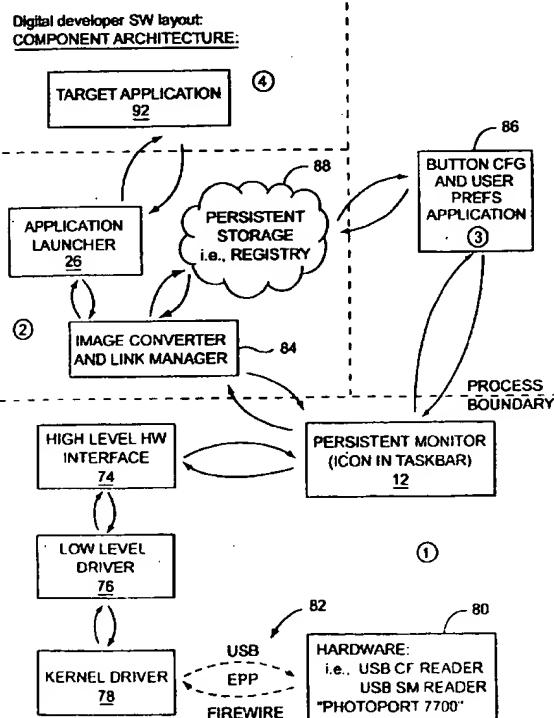
Published:

(71) Applicant: VISIONEER, INC. [US/US]; Suite 150, 5673 Gibraltar Drive, Pleasanton, CA 94588-8547 (US).

- without international search report and to be republished upon receipt of that report

[Continued on next page]

(54) Title: COMBINATION SCANNER AND IMAGE DATA READER SYSTEM INCLUDING IMAGE MANAGEMENT SOFTWARE AND INTERNET BASED IMAGE MANAGEMENT METHOD



(57) Abstract: Apparatus and methods for automatic, computer-based image management, including reading, transfer, and storage, and to related software for acquisition, transfer, editing, processing, copying, and archiving of images by the apparatus in accord with the methods. More particularly, the invention comprises image input devices of which specific examples include digital scanners, digital media readers, and a combination of the two, and software that makes possible the complete processing and archiving of digital images with the press of a single button or the act of inserting the media in the device. The inventive processing and archiving image management hardware and software system includes non-camera digital image acquisition, data transfer, display, manipulation (including cropping, adjusting colours, and other such editing), storage, thumbnailing, printing, and electronic transmittal of processed digital image data. In addition to replicating the traditional photographic film development process for digitally acquired images in a software enablement, the inventive image management software adds substantial functional features in the context of user-friendly ease and speed of use.

WO 02/35469 A2

WO 02/35469 A2



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

**TITLE: COMBINATION SCANNER AND IMAGE DATA READER
SYSTEM INCLUDING IMAGE MANAGEMENT SOFTWARE
AND INTERNET BASED IMAGE MANAGEMENT METHOD**

5

Field of the Invention:

The invention relates to apparatus and methods for automatic, computer-based image management, including reading, transfer, and storage, and to related software for acquisition, transfer, editing, processing, copying, and archiving of images by the apparatus in accord with the methods. More particularly, the invention is directed to the use of desktop image acquisition peripherals, primarily removable media readers alone or in combination with digital scanners to automatically acquire and transfer images for transport (e.g., e-mail), editing, processing, archiving, copying, and printing.

Background:

Once consumers capture images with their cameras, whether digital or traditional film, they can have prints made from those images, although the methods by which the captured images become printed pictures differs greatly. The consumer also stores the physical prints, and in the case of traditional cameras, can store the negatives. Similarly, in the case of digital images, the consumer can store the files on computer media: hard drives, CD-ROM drives, or other storage devices. Generally, however, consumers using traditional cameras have no simple way of archiving the images on their computer.

Traditional Film Image Capturing Process

The established photographic negative-film process requires that consumers take pictures, remove the film from the camera, submit the film to a processing lab, and wait for from one hour to one or more weeks for return delivery of standard image prints, negatives, or electronic media recordings. An example of an electronic media recording is the Kodak Picture CD, a CD on which is stored the images from one roll of conventional film in several resolutions, up to and including approximately 1024 pixels by 1536 pixels. Ordering such a CD often adds a day or so to the film roll processing-to-print cycle.

Once the consumer receives the standard prints from the processing lab, the consumer can review them and select those prints that the consumer desires to have reprinted in larger format, used in or on a product, or otherwise reprocessed. The consumer must then resubmit the developed negatives so that the post-processing vendors can prepare the selected products. This step takes additional time, usually from several hours to one or more weeks. Furthermore,

this step involves the consumer sending the source images, i.e., the negatives, to an outside source, endangering the integrity of the consumer's source negatives archive.

Archiving traditional film images involves storage of prints in boxes or photo albums, or digitizing the images for archiving on a computer. Electronic media recordings, received from the professional processor make this step easier, although the software to automatically archive images typically is not user friendly. In cases where the consumer did not order electronic media, or where the consumer desires to archive older prints made before the availability of electronic media, the prints can be scanned into the computer using a digital scanner. Such scanners, and their necessary software systems, are discussed below.

10 Digital Image Capturing Process

In digital camera imaging systems, the image capture and archiving process is different. After taking pictures with a digital camera, the consumer loads image-processing software on a computer, inputs the images from the camera into a computer via a cable, infra-red link, removable media card, or the like, edits the images with the software, and then outputs the images to a printer. Typically, the prints do not match the resolution or quality (e.g.) long lasting, high quality prints made by traditional film processing labs. However, resolution of the images is increasing. Cameras are now available having resolutions of several megapixels; for example, Foveon (Santa Clara, California) and Eastman-Kodak have recently announced 16 megapixel (4096 pixels by 4096 pixels) cameras.

20 In order to obtain professional prints, or prints placed on or in products, the digital camera consumer must find a way to transfer high-resolution images to a professional processing center, several of which may be accessed via the Internet. The consumer must upload images to those centers in order to receive professional products. However, many digital cameras do not produce digital image files of sufficient resolution to be used for large prints or detailed products. Additionally, many cameras use compression, which further limits the production of quality output. However, assuming the digital image file is of sufficient resolution and compressed using high quality, once the consumer transfers the file to a professional processing company, printed images or products can be produced.

25 Digital Scanners

30 Consumers can scan prints, both old and new, into computers using digital scanners and associated software. Typical scanners have a variety of features that determine their quality and simplicity of use, including scanning resolution, color depth, one-touch buttons, and other features, each of which is discussed below. Scanners also allow consumers to scan documents and non-photographic images into a computer for further processing. Documents can be

converted from image files into text and electronic documents, editable by standard word processing programs. Sketches and drawings can be turned into electronic images.

Scanning Resolution: The optical resolution of the images acquired by digital scanners is a function of the number of pixels in the CCD/CIS unit of the scanner. Scanning is done in a 5 Cartesian mode, i.e., a linear array of pixels are mounted on a bar transverse to the longitudinal (vertical) axis of the scan area; the bar is moved as a unit along a path normal to the orientation of the bar (or the image being scanned is moved relative to the bar). A pixel is a small area on the surface of an image sensor that is sensitive to light. The pixel measures the intensity (brightness) of the image and the scanner forms an image from the combination of pixels. In 10 that way, the number of pixels on the scanner's image sensor bar determines the horizontal optical resolution of the scanner. The distance the bar or paper advances between acquisitions determines the vertical resolution. For example, a scanner with a resolution of 600 dots per inch (dpi) x 1200 dpi has 600 pixels on its sensor bar which moves 1/1200 of an inch between 15 each acquisition. Together, the horizontal and vertical resolutions constitute the optical resolution and determine the level of detail that the scanner can capture. Typical digital scanners today provide optical resolutions around 600 x 1200 dpi, with a few models offering optical resolutions of 1200 x 2400 dpi. Those resolutions are expected to increase with improvements in scanning technology.

Color Depth: Color depth is ability of the sensor in the scanner to capture accurate 20 color. The sensor captures a combination of three colors (red, green, and blue) and can capture a certain number of shades of each of those colors. The most common scanner sensors capture eight bits of color resolution (two to the eighth power or 256 shades of each color). Today's scanners are capable of capturing eight, ten, or twelve bits of resolution per color. These color 25 depths result in images containing 16.7 million (24-bit, or three 8-bit) colors to 68.7 billion (36-bit, or three 12-bit) colors. Although some new scanners are capable of 42-bit images, most use software to approximate the colors above 36-bits and a few use software to create 48-bit images.

Many scanners scan at a high internal resolution but output the image to the computer 30 at a much lower resolution. The high resolution scanning creates digital image files that are often immense and require the scanner to scan very slowly because of the limited data transfer capabilities between the scanner and the host system. This limitation is dependent upon the transfer protocol used, i.e. USB, EPP or SCSI. There are a variety of compression functions that can speed the transfer, e.g., reducing the final image color depth, using a JPEG compression scheme to reduce the file size, or other methods of reducing the file size. In these

ways, the scanner can send the image to a computer much more quickly.

Exemplary Commercially Available Scanner Technology: By way of example, the Visioneer One Touch™ 8800 Scanner (8800) (Visioneer, Inc., Pleasanton, CA) is a digital flatbed scanner with dedicated function buttons that work with integrated software to make scanning tasks simple and fast. The prime features of the 8800 include J.E.T. compression, a proprietary system that uses a compression engine, consisting of one or more compression algorithms, to allow the scanner to complete scans much faster than normal by using various degrees of JPEG compression. The algorithms used for JPEG compression allow consumers to select between the highest image quality and the fastest scanning speed.

The 8800 is completely self-configuring, requiring only that the consumer install the software and plug in the scanner. After that, the software configures the computer in the background. Once connected, the scanner allows the consumer to scan images by placing an image on the scanner glass and touching a single "scan" button. The background scanning software creates an electronic image file and places the scanned, digital image wherever the consumer decides, e.g., in a default directory on the computer or directly to a computer network. A second software-controlled button on the scanner allows a single press of a selected, dedicated, button to instruct the computer to accept a scanned image and send it to a printer. A third dedicated button transmits the image via fax software (with only a telephone number input needed) and allows the consumer to send the image to any fax machine. A fourth dedicated button runs the digital image file (if the image is an image of a document that includes text) through an Optical Character Recognition (OCR) program to convert the portions of the image that are of text into actual text data for display or editing, as text. A fifth dedicated button labeled "e-mail" creates an attachment image file and attaches it to an e-mail document that the consumer need only address to an e-mail recipient. The Visioneer Model 8800 hardware includes a sixth button, labeled "custom," a software-configurable function button that allows the consumer to define the actions taken by the hardware/software system when that button is pressed. The software further allows the consumer to reprogram any of the pre-programmed buttons to activate whatever custom function the consumer selects beforehand.

30 Removable Media:

There are several basic types of removable electronic or magnetic data storage media currently available for digital imaging. These currently include, but are not limited to, Compact Flash Memory cards, Smart Media cards, PC Cards (PCMCIA Cards), Memory Sticks, Multi Media cards, Secure Digital cards, and the like. The consumer can insert these

various media "cards" into dedicated special-purpose card readers that transfer images contained in the cards to a computer. Each of the media cards uses its own proprietary technology to accomplish the same storage task.

"Digital film" is the generic term that the field has adopted for such removable media cards designed specifically for use in digital cameras. Current digital film readers typically consist of a cable and a device through which software on a computer can download the digital image data to the computer for creating a file and for processing. Many cameras can also act as digital film readers in that they can directly transfer to computers the digital image data that they have stored on inserted digital film. Such cameras, however, are typically limited in battery life and transfer speed, and the camera must be linked to the computer for the entire time it takes for the transfer. Accordingly, such transfers are inconvenient, and consumers consequently purchase separate card readers to attach to their computers.

Photo Printers and Scanners:

Some currently available computer printers now include digital-film readers built into the printer body. As stand-alone devices, these printers can read certain media and immediately, without a computer, print the image files that are stored on the media. The Lexmark/KODAK Model PM100 printer can read some digital film, namely, Compact Flash and Smart Media cards. Special features on the printer allow the consumer to size, crop, and, to a very limited degree, edit images directly on the printer. Consumers can also print out an index of all the images stored on their removable media cards. In addition, the KODAK Model PM100 printer permits direct printing of image files from Iomega Zip disks, and permits transfer of the image data files to an Iomega Zip disk, without a computer interface. The Microtek (Redondo Beach, California) ImageDeck is a scanner connected to an Iomega Zip drive that allows consumers to save scanned images on Iomega Zip disks.

Although the above technologies are currently available on the market, there is no integration of these products into a simple, easy to use, single solution for transferring both traditional photos and digital images into consumer computers and allowing easy archiving, thumbnailing, and transferring of images to professional processing vendors. There is thus an unmet need in the art for a more comprehensive integrated hardware and software system.

30

THE INVENTION

Summary, Including Objects and Advantages:

The invention is directed to digital image acquisition and transfer devices, image data storage, image data handling and management, hardware control, image archiving, and paper-to-electronic-form-image document conversion and operational software therefor. More

particularly, the invention comprises image input devices of which specific examples include digital scanners, digital media readers, or a combination of the two, and software that makes possible the complete processing and archiving of digital images with the press of a single button or the act of inserting the media in the device. The inventive processing and archiving 5 image management includes non-camera digital image acquisition, data transfer, display, manipulation (including cropping, adjusting colors, and other such editing), storage, thumbnailing, printing, and electronic transmittal of processed digital image data. In addition to replicating the traditional photographic film development process for digitally acquired images in a software enablement, the inventive image management software adds substantial 10 functional features in the context of user-friendly ease and speed of use.

The inventive hardware and software provide a system for uploading digital images from scanned prints, negatives, or digital film via the inventive hardware. The inventive system converts the raw, digitized images into standard computer files, such as JPEG files, which permits professional printing by sending the image files to a printer or to a professional 15 printing service, such as PhotoWorks. Moreover, in the embodiment that employs a digital scanner to scan prints or negatives, the inventive hardware and software system allows the traditional film camera user to digitize images from the traditional film prints and negatives, thereby extending the inventive processing to traditional film.

The inventive system apparatus is described by reference to a scanner, such as the 20 Visioneer 8800 by way of example and not by way of limitation. In a first embodiment, the apparatus aspect of the invention comprises a digital scanner incorporating at least one digital film reader ("card" media reader), linked to, and logically controlled by, the inventive software. The scanner preferably supports an improved image resolution by increasing the optical resolution to 1200 x 4800 dpi by employing a tightly packed sensor bar that can read 25 1200 dpi (1200 pixels per inch of length of the bar) and moves 1/4800th of an inch between lines of scanning. The inventive apparatus, however, is not limited to the presently preferred image resolution and can be any typical scanner resolution, including future higher resolution scanners. In addition, the preferred scanner includes a 42-bit color sensor that optically captures 42-bits of color depth, which can be enhanced electronically to a 48-bit output. The 30 scanner subassembly of the invention can scan images at 42-bit resolution, and can transfer the acquired image data to the computer without degrading the image color, providing a realistic color rendering.

In this first embodiment, the digital film reader comprises at least one removable media reader that transfers image data between the digital film and the inventive software. The

hardware and software system of the invention automatically detects the insertion of the media into the one or more readers and routes the image data to the pre-selected application, as directed by the dedicated hardware or software button selected.

The inventive hardware can support one or more digital film readers. The hardware can be connected to the computer system through a USB, FireWire, SCSI, IEEE 1394, or a functionally equivalent port. The inventive hardware contains an internal seven port USB hub, with the scanner and one or more digital film readers permanently connected as USB peripherals. In this way, the inventive hardware can optionally have one or more available USB ports to which other USB peripherals, including digital cameras, can be connected.

The digital film readers included in this hardware embodiment can be set up, by the software of the system, to be recognized by the attached computer system as separate removable media drives. Thus, once installed, the inventive apparatus is reflected on the computer as at least one removable media disk drive, to which a letter is assigned by the computer operating system. As such, the computer can access any files on inserted digital film. The computer can thus read and write files to the digital film, and such files can include not only digital image files, but also any other files.

The method by which the software system enables the computer to access the digital film is as if that film is a removable hard drive, thus allowing the computer direct control of digital film still resident in a digital camera. There is then full computer access to the digital film and files can be read or written to, including image data files, document files, and executable files.

Once the apparatus system of the invention either scans an image or reads digital image data from digital film, the software system automatically processes the images in an essentially identical manner. In other words, the software system treats both scanned images and digital camera/digital film pictures in a common manner, once the image data files are acquired.

The software system manages the image data transfer via a menu of destination/action choices, which are enabled both as on-screen menu choices and as dedicated hardware buttons. The choices include the following exemplary transfers (via clickable button images or other icons) of the image data file: to a hard drive either on the local computer or anywhere on a network (for archiving or temporary storage); to a printer; to fax software that subsequently asks for a telephone number and sends the image data as a fax; to an OCR program to convert any text that may be in image format to editable text; to an e-mail program to send the image as an attachment to an e-mail; to any other application that the consumer selects, e.g., PhotoShop (for image manipulation and management); or to directly send images to an

associated professional quality photographic processing company, such as PhotoWorks. For local printing, the software system sends the image to a local printer directly connected to the host computer, or via LAN or WAN network. For remote printing, the software system sends the image over the Internet.

5 The inventive software optionally can include functionality that allows consumers to easily connect with an associated professional processing company. When the consumer selects images to be printed by an online printing service such as PhotoWorks, an applet determines the current special deals being offered by the processor and presents those offers to the consumer, e.g. by rendering them on the computer screen. These offers may include
10 various option selection buttons.

In a second embodiment, the scanner may be omitted, leaving a device with at least one digital film reader and the several described one-touch buttons. The digital image data from the reader is processed as described above by the inventive software.

15 In a third embodiment, the hardware one-touch buttons may be omitted, leaving a device with at least one digital film reader that works automatically in concert with the inventive software. The functionality of this embodiment includes all the inventive software-controlled functionality as described above.

Brief Description of the Drawings:

The invention is described in more detail by reference to the drawings in which:

20 Fig. 1A is an isometric illustration of the first embodiment of the invention, showing the digital film reader slots on the body of a flatbed scanner; Fig. 1B shows the scanner with an open lid; Fig. 1C is a blown up drawing of the pushbutton panel, and Fig. 1D is a line drawing of the rear of the scanner, showing power and USB connections;

25 Figs. 2 through 5 are software system process flow charts demonstrating the processes invoked by various consumer actions, and which programmers skilled in the art will recognize as software layout for use to write appropriate software code to realize the functionality shown;

Fig. 2 is a software layout illustrating the inventive, software-enabled process that is initiated upon insertion of digital film into the media reader, either as a stand-alone device or in combination with a scanner;

30 Fig. 3 is a software layout illustrating the inventive process initiated upon pressing one of the hardware buttons;

Fig. 4 is a software layout illustrating the component architecture of the software system;

Fig. 5 is a software layout illustrating the component architecture that relates to the

software component that allows the consumer to select archived images to send to a professional printing service (e.g., PhotoWorks);

Fig. 6 is a screen capture of the software interface for selecting and sending images to a print processor/digital image archival service center, such as PhotoWorks;

5 Fig. 7 is a screen capture of the software aspect that allows the consumer to determine and select which images or what portion of an image PhotoWorks should print; and

Fig. 8 is a screen capture of the software aspect that allows the consumer to configure and customize the functionality of the hardware buttons.

Detailed Description, Including the Best Modes of Carrying Out the Invention:

10 The following detailed description illustrates the invention by way of example, not by way of limitation of the principles of the invention. This description will clearly enable one skilled in the art to make and use the invention, and describes several embodiments, adaptations, variations, alternatives, and uses of the invention. The description includes what are presently believed to be the best modes of carrying out the invention.

15 In this regard, the invention is illustrated in several figures (and tables where included), and is of sufficient complexity that the many parts, interrelationships, process steps, and sub-combinations thereof simply cannot be fully illustrated in a single patent-type drawing or table. For clarity and conciseness, several of the drawings show in schematic, or omit, parts or steps that are not essential in that drawing to a description of a particular feature, aspect or principle 20 of the invention being disclosed. Thus, the best mode embodiment of one feature may be shown in one drawing, and the best mode of another feature will be called out in another drawing. Process aspects of the invention may also be described by reference to one or more examples, which are merely exemplary of the many variations and parameters of operation under the principles of the invention.

25 Fig. 1A is a front elevation in perspective of a currently preferred, first embodiment of the invention, illustrating a flatbed scanner body 150, lid 158, two digital film slots 152, 154, and a USB connector 156 in the front. In this image, there are six buttons visible 160, representing the six functional buttons of the hardware system, including a scan button, a copy/print button, a fax button, an OCR button, an e-mail button, and a customizable button. 30 An embodiment capable of reading fewer or more types of digital film would have fewer or more media reader slots visible, and an embodiment having USB ports for connecting to other peripherals would have more of the USB ports 15b.

Fig 1B is a front elevation as in Fig. 1A, showing the lid 158 open, revealing the document cover 162 and the scanner glass 164. Fig 1C shows a detailed line drawing of the

push button panel 160 as well as the status light 166. Figure 1D is a line drawing of a USB port 170 as well as the separate power input port 168, located on the rear of the unit.

Fig. 2 depicts functionality of the software system 10 of the invention, including a "persistent monitor" (PM) 12 that continually checks the status of the hardware, e.g. by timed polling. Fig. 2 shows the PM polling the digital media reader (DMR), included in each of the three embodiments described above, to determine presence or absence of media inserted therein, 14. The monitor checks whether a card has been inserted into any of the media readers. If not, 16, the PM waits a preset duration of time, say 30-300 milliseconds, 18, and checks again. Once a card is detected 20, the inventive software reads the card media to determine whether there is more than one digital image file stored in the media 22. If so, 24, the software system invokes the image selection program 26, typically an applet written in C++ or any other suitable computer language. The consumer then selects one or more of the image(s) detected. If there is only one image on the digital media 28, the software system automatically selects that image. In either event, the software system sends the image(s) to the configured target 30, whether that target is e-mail, processing, or any of the other functions of the software system described herein. In the case of the third embodiment, where there are no buttons, the consumer pre-selects the automatic procedure that the inventive software is to initiate upon media insertion. If no such procedure has been selected, the inventive software system will pause and request the consumer to select a function. Once the image processing is complete, the software system waits for the card to be removed 32 before again monitoring (polling) the media reader 34, 18.

Fig. 3 is a software layout in flow chart format that shows the functionality of the inventive software 10 in situations in which the PM 12 detects the pressing of one of the buttons 32 of the scanner/DMR hardware of the invention. If no button is pressed, 36, the system waits, e.g., 30-300 ms, and checks again (the "wait loop" 18). Once the PM detects a button having been pressed 40, the software system checks to see if there is a card in the media reader, 14.

If there is a card in the reader 20, as in Fig. 2 the system checks to see if the scan button has been pressed, 42. If not, 44, the system checks to see how many digital image files are on the card, 22. If there is more than one image 24, the system launches the image selection applet 26. As described in more detail below with reference to Fig. 4, the application launcher initiates the image selection software in a separate process to improve system stability. In general, the image selection software (applet) allows the consumer to select one or more images. Once the consumer selects the image(s), (or if there was only one image), the

inventive software selects that image and determines which button was pressed to determine which application to launch and to which application to provide the image.

Continuing with reference to Fig 3, if there is no media card 16 in the DMR and the hardware of the invention contains only the media reader, then the PM returns to its normal 5 polling state via wait loop 38, 18. If, instead, the embodiment contains a scanner and there is no media card in the media reader, the inventive software system checks whether the button pressed is associated with a scan function 42. If the button is not associated with some function that allows scanning an image, then the system returns to the PM mode 12. If the button does call for scanning (as most of the possible button functions do), the inventive 10 software causes the scanner of the hardware to scan the image 48 at the preselected image resolution or at other parameters as set by the user in the configuration, or as the automatically-installed generic configuration (default) requires.

Once the inventive software system has narrowed down its selection of images to one image 28, as shown by Fig. 3, the inventive system determines which button 52, 54, 56, was selected. By way of non-limiting example, if the system determines that the print button 52 was pressed 58, the system sends the image 60 to a local printer or to a remote printer, such as to PhotoWorks, after invoking the appropriate application which includes, but is not limited to, the print feature of an attached computer or a link to the processor. If the print button was not pressed, 62, the software checks if it was the "e-mail" button 54. If so, 64, the system creates 20 an e-mail 66, with the image attached and allows the consumer to edit and address the e-mail. If the button was not the "e-mail" button, 68, the system then checks which of the application buttons 56, including any customized buttons, was pressed. If yes, 70, the system then converts the image to the appropriate form 72 and launches the application with the image file open in the application. Once completed, the system resets to the wait loop 38, 18.

25 Fig. 4 illustrates a layout of an implementation of the inventive system software in terms of its component architecture boundaries. In this Figure, there are four discrete process regions, ①-④, delineated with dashed lines. The dashed lines represent the respective process boundaries. Each process runs independently of the others, so that if any one process crashes, the remaining processes continue to function as normal. By keeping the target applications, the 30 image converters, the configuration programs, and all the other aspects of the inventive software that do not require communication with the kernel driver in processes separate from the system kernel driver 78, program instability will not result in a computer system crash. This ensures a safe operating system environment.

As shown in the primary process ① at the bottom of Fig. 4, the PM interface 12 is

associated with both a high, 74, and a low-level, 76, interface. The high-level interface software 74 communicates between the PM 12 and the low-level drivers 76. The PM appears as an icon in the taskbar, typically on the bottom right-hand portion of the computer monitor.

The icon functionality can include, by either right or left clicking on the icon, the following features: a button configuration application (see process section ③); a consumer preference application; image manipulation applications; a link manager; and/or other applications. This functionality provides a convenient on-screen view of the hardware buttons, allowing selection of buttons on screen with a mouse. The low-level driver portion 76 controls, and receives feedback from, the hardware 80 through the operating system's kernel driver 78. Since the kernel driver operates within the system kernel, the inventive system limits processing through the kernel to ensure system stability. Connectivity between the CPU (not shown) and the hardware 80 is via USB, Enhanced Parallel Port (EPP), Firewire, Bluetooth, iLink, IEEE 1394, Network cable, or other suitable connection, 82.

Also shown in Fig. 4, the component section ② image converter and link manager process 84 receive input from the button configuration and consumer preference applications 86 (component section 4) via persistent storage, e.g. system registry 88, and then determines whether the application launcher 26 is necessary. The application launcher can then select and launch the target application(s) 92 in component section ④.

Fig. 5 illustrates the architecture of the digital developer software system 94, the functionality of which includes all aspects of sending images across the Internet for professional processing, printing, product placement, or other purposes. The independent process boundaries are shown in dashed lines as in Fig. 4. Once the consumer has selected, for example, professional printing 60 (as determined by the PM and the various previously described software layout flow charts), the consumer selects which images 26 to send for processing, printing, placing on products, or any other option available through the professional processing and printing company, such as PhotoWorks.

Once the consumer has selected which images to send, the software system of the invention verifies user information 98 and can optionally invoke the Special Offer applet 96, when the consumer selects "order" from a menu to order prints. The application launcher launches the Special Offer applet 96 as a target application, in a new process. That process is independent of the rest of the inventive software system so that any instability in the applet, or through the Internet (102, Fig. 5) upon connection to the processor, will not result in a crash of the inventive software. The applet first downloads, 90, the current price table (in XML or other format) from the print processor. During the order process, the applet will display all of

the current Special Offers and the required eligibility parameters. The consumer will select an applicable Special Offer and the applet will query the processor to determine whether the consumer is eligible for the offer 98. If the consumer is eligible, the applet downloads an additional module that can execute the offer during price calculation.

5 By way of non-limiting example, such a Special Offer could be a free set of up to 24-4x6 inch prints, for first time consumers. The applet will show the offer to the consumer who has selected several images and "ordered" prints. If the consumer selects the free set of prints, the applet will determine whether the consumer is a first time consumer by consulting a relational data base of the processing service vendor (e.g., in its servers 104). If the consumer
10 is a first time consumer, then a module will download and reduce the price of the first 24 4x6 prints ordered to zero and the final price will reflect that change.

Once the order has been prepared, as shown in Fig. 5, the image uploader software 100 ensures the delivery of the images via the Internet 102 to the processing center's computers 104. The uploader software ensures proper delivery of the images by resending images when 15 dialup connections fail, when the processing center does not receive complete, uncorrupted images, or under any circumstances under which the processor does not report having successfully received all of the images sent by the uploader. The uploader software works automatically, in the background, and requires no input from the consumer. At the processing center, an example of which is PhotoWorks, the image(s) are processed and printed out in 20 professional quality as the order so requests. Those printouts 106 can then be sent via mail 108 to the consumer.

Fig. 5 also demonstrates the process boundaries as described above for Fig. 4. In Fig. 5, each illustrated portion of the inventive software is shown as a different process. By separating the processes as shown in Fig. 5, if any one of those individual process sections 25 crashes, the system remains stable.

Fig. 6 is a screen capture of the software interface 110 for selecting and sending images to PhotoWorks. In this Fig., three images 112 a, b, c are shown in an image selection area 114. These three images will be sent to PhotoWorks once the consumer clicks on the "Place Order" software button 116. Optionally, once the consumer clicks on "Place Order," the application 30 launcher will launch the above-described Special Offer applet 96 (Fig. 4). As shown, the software allows the consumer to enter a name and password 118, which information will be used to access Account Information and thus to process the order and bill the consumer for the services to be rendered.

Fig. 7 is a screen capture of the software aspect that allows the consumer to determine

and select which image(s) or what portion of an image PhotoWorks should print. In this exemplary screen capture, the consumer has selected the right one of the images (112c) shown in thumbnail form on the background screen capture (repeat of Fig. 6), that of the antenna ball by clicking on that image.. The foreground screen capture shows that the consumer can select, 5 by use of the mouse or keyboard, to outline the portion of the image to crop 120 and send to PhotoWorks. The buttons 122 on the bottom left corner of the screen capture show that the consumer can rotate the image to the left or right (to correct the image orientation) and can scroll through the thumbnails. Once the consumer selects the portion of the image to print, the consumer clicks on the "apply" button 124 to crop the image. In the "Print Size" selection box 10 126, the consumer can select what size to print the image, from 3x5, 4x6, 5x7 or to any other common image size by the drop down menu. Once done, the consumer presses the "okay" button 128 and proceeds with the order. Likewise the selections can be canceled, 130.

Fig. 8 is a screen capture 140 of the software aspect that allows the consumer to 15 configure and customize the functionality of the hardware buttons see 86 in Fig. 4. In this screen capture, a set of tabs 132 (here, 7) can be seen. Each of these tabs allows an aspect of the functionality of the software system to be customized and manipulated by the consumer. In this screen shot, the Scan feature, or the Scan button (42 in Fig. 3), is being customized 142. The consumer has selected the Scan feature to send the image scanned to destination = PhotoWorks 134 (in the left side of the image), and has configured the scanner to scan in color, 20 at 300 dpi, on a full page, with 50% contrast, and 50% brightness, 136. Once this information is input into the system ("OK", 138), when the consumer selects the Scan button 42 (Fig 3), the inventive software and hardware will send the image data taken from the scan of the image and send it directly to PhotoWorks via Internet (102, 104, Fig 5) for reproduction at the print properties 136.

25 **Industrial Applicability:**

It is clear that the system of the invention comprising a digital image acquisition device that can include digital scanner and/or a digital media reader, along with transfer software, has wide industrial application, among others for small office, home office, and personal use.

Because the system allows the consumer to manipulate digital images, it will work 30 where consumers need advanced image processing or the convenience of a one-touch hardware and software system. The image processing includes automatic e-mails, image editing, archiving, copying, printing, or sending images for professional processing and printing.

Claims:

1) An image acquisition apparatus connected to at least one USB equipped computer, comprising:

5 a) image input means for inputting image data into a control circuit within said apparatus;

b) transmittal means for sending said image data from said control circuit through the USB system of said computer;

c) interface means for said control circuit to receive instructions from, and send data to, control software on said computer.

10 2) An apparatus as in claim 1, wherein said image input means comprises at least one of a Compact Flash Memory card reader, a Smart Media card reader, a PC or PCMCIA Card reader, a Memory Stick reader, a Multi Media card reader, a Secure Digital card reader, and a IBM Microdrive reader;

15 3) An apparatus as in claim 2, further comprising simple control means for directing complex operations of said control circuit and said control software directly from the outside of said apparatus, said means comprising:

a) at least one button on said apparatus wherein said button has a function determined by said control software;

20 b) an interface for said button to direct said control circuit and said control software.

4) An apparatus as in claim 3, wherein said image input means further comprising a scanner, said scanner comprising:

25 a) a transparent platform for placing items to be scanned, said items comprising photographs, documents, or drawings, and said platform having rectangular dimensions;

b) optical scanning hardware for scanning images of said items, wherein said hardware includes a scanning module slidably installed inside said housing, said scanning module being approximately as wide as one of the dimensions of said transparent platform, said scanning module comprising:

30 i) a mechanism and assembly for moving said module along one of the axes of said transparent platform;

ii) a bottom light source for emitting light towards said items,

iii) an image converter for converting said image of the item into a digital image.

c) a closeable top with dimensions slightly larger than the dimensions of said transparent platform, hingedly attached to said housing so that said top covers said transparent platform when closed.

5) An image processing method in an image acquisition apparatus connected to at least one USB equipped computer, comprising:

a) an image input step for inputting image data into a control circuit within said apparatus;

b) a transmittal step for sending said image data from said control circuit through the USB system of said computer;

10) c) an interface step for said control circuit to receive instructions from, and send data to, control software on said computer.

6) A method as in claim 5, wherein said image input step comprises detecting the insertion of the appropriate media into at least one of a Compact Flash Memory card reader, a Smart Media card reader, a PC or PCMCIA Card reader, a Memory Stick reader, a Multi Media card reader, a Secure Digital card reader, and a IBM Microdrive reader;

7) A method as in claim 6, further comprising simple control steps for directing complex operations of said control circuit and said control software directly from the outside of said apparatus, said steps comprising:

a) providing at least one button on said apparatus wherein said button has a function determined by said control software;

b) providing an interface for said button to direct said control circuit and said control software.

8) A method as in claim 7, wherein said image input step further comprises providing a scanner, said scanner comprising:

a) a transparent platform for placing items to be scanned, said items comprising photographs, documents, or drawings, and said platform having rectangular dimensions;

b) optical scanning hardware for scanning images of said items, wherein said hardware includes a scanning module slidably installed inside said housing, said scanning module being approximately as wide as one of the dimensions of said transparent platform, said scanning module comprising:

i) a mechanism and assembly for moving said module along one of the axes of said transparent platform;

ii) a bottom light source for emitting light towards said items,

iii) an image converter for converting said image of the item into a digital image.

5 c) a closeable top with dimensions slightly larger than the dimensions of said transparent platform, hingedly attached to said housing so that said top covers said transparent platform when closed.

9) A method comprising:

a) persistently monitoring any monitorable input means of an image acquisition apparatus;

b) determining whether said input means have image-containing media

10 therein;

c) determining the quantity of image data files in said media;

d) selecting at least one image data file from said media;

e) transmitting said at least one image data file from said image acquisition apparatus to a computer;

15 f) providing said image data file to a consumer-selected computer application.

10) A method as in claim 9 further comprising:

a) persistently monitoring any buttons on said image acquisition apparatus;

b) determining whether any said buttons have been pressed;

20 c) selecting the appropriate consumer-selected computer application to which to provide said image data based on the predefined functions of said buttons.

11) A method as in claim 10 further comprising:

a) determining whether there is a scanner associated with said image acquisition apparatus;

25 b) selecting a set of scanning criteria as chosen by the consumer; and

c) scanning an item on the transparent platform of said scanner at said selected set of scanning criteria where there is no media card in said input means.

12) A method as in claim 11 wherein said consumer-selected computer application is selected from

30 an application to transfer said image data files to an Internet-based professional photograph printing company,

an application that launches said consumer's e-mail program and attaches said image data files to an e-mail created by said e-mail program,

an application that launches said consumer's fax program and prepares a fax

with said image in said fax for said consumer to address,

an application to open a printer selection menu to allow said consumer to print said image on a selected printer,

an application that archives said image data files in a convenient manner, and

5 an application that presents the image data file to any other application on said consumer's computer for said any other application to use as an input into said any other application.

13) A method as in claim 12 wherein said consumer can selectively configure said computer application choices.

10 14) Computer-readable media comprising one or more computer-executable instruction sets that, when executed, direct a computer to:

a) persistently monitor any monitorable input means of an image acquisition apparatus;

b) determine whether said input means have image-containing media therein;

c) determine the quantity of image data files in said media;

d) select at least one image data file from said media;

e) transmit said at least one image data file from said image acquisition apparatus to a computer;

20 f) provide said image data file to a consumer-selected computer application.

15) Computer-readable media comprising one or more computer-executable instruction sets as in claim 14 that, when executed, direct a computer to:

a) persistently monitor any buttons on said image acquisition apparatus;

b) determine whether any said buttons have been pressed;

c) select the appropriate consumer-selected computer application to which to provide said image data based on the predefined functions of said buttons.

25 16) Computer-readable media comprising one or more computer-executable instruction sets as in claim 15 that, when executed, direct a computer to:

30 a) determine whether there is a scanner associated with said image acquisition apparatus;

b) select a set of scanning criteria as chosen by the consumer; and

c) scan an item on the transparent platform of said scanner at said selected set of scanning criteria where there is no media card in said input means.

17) Computer-readable media comprising one or more computer-executable instruction sets as in claim 13 that, when executed, direct a computer to:

a) launch an application that allows the consumer to customize which applications are launched with which parameters at the press of which buttons on said image acquisition apparatus.

18) Computer-readable media comprising one or more computer-executable instruction sets as in claim 14 wherein:

a) said persistent monitoring occurs in a process boundary with the kernel driver, low level driver, and high level user interface;

10 b) said program launching application runs in a process separated from said persistent monitoring process; and

c) said applications launched by said program launching applications run in their own processes.

15 19) Computer-readable media comprising one or more computer-executable instruction sets as in claim 17 wherein:

a) said persistent monitoring occurs in a process boundary with the kernel driver, low level driver, and high level user interface;

b) said program launching application runs in a process separated from said persistent monitoring process;

20 c) said applications launched by said program launching applications run in their own processes; and

d) said button configuration application runs in its own process, separate from said persistent monitoring process.

25 20) An electronic ordering method for image products comprising:

a) providing the customer with the ability to select images for said product ordering from images on said customer's computer;

b) accessing electronically a current price table from the product supplier;

c) accessing electronically a listing of special offers from said product supplier;

30 d) inputting said customer's order of said product, including said customer's selection of special offers;

e) determining whether said customer qualifies for said special offers;

f) selectively applying said special offers that said customer qualifies for to said customer's order; and

g) providing said customer with a new order total price.

21) Computer-readable media comprising one or more computer-executable instructions that, when executed, direct a computer to:

a) provide the customer with the ability to select images for said product

5 ordering from images on said customer's computer;

b) access electronically a current price table from the product supplier;

c) access electronically a listing of special offers from said product supplier;

d) input said customer's order of said product, including said customer's

10 selection of special offers;

e) determine whether said customer qualifies for said special offers;

f) selectively apply said special offers that said customer qualifies for to said customer's order; and

g) provide said customer with a new order total price.

15 22) Computer-readable media comprising one or more computer-executable instructions as in claim 21 wherein said instructions are run in a separate process boundary without other applications.

1/9

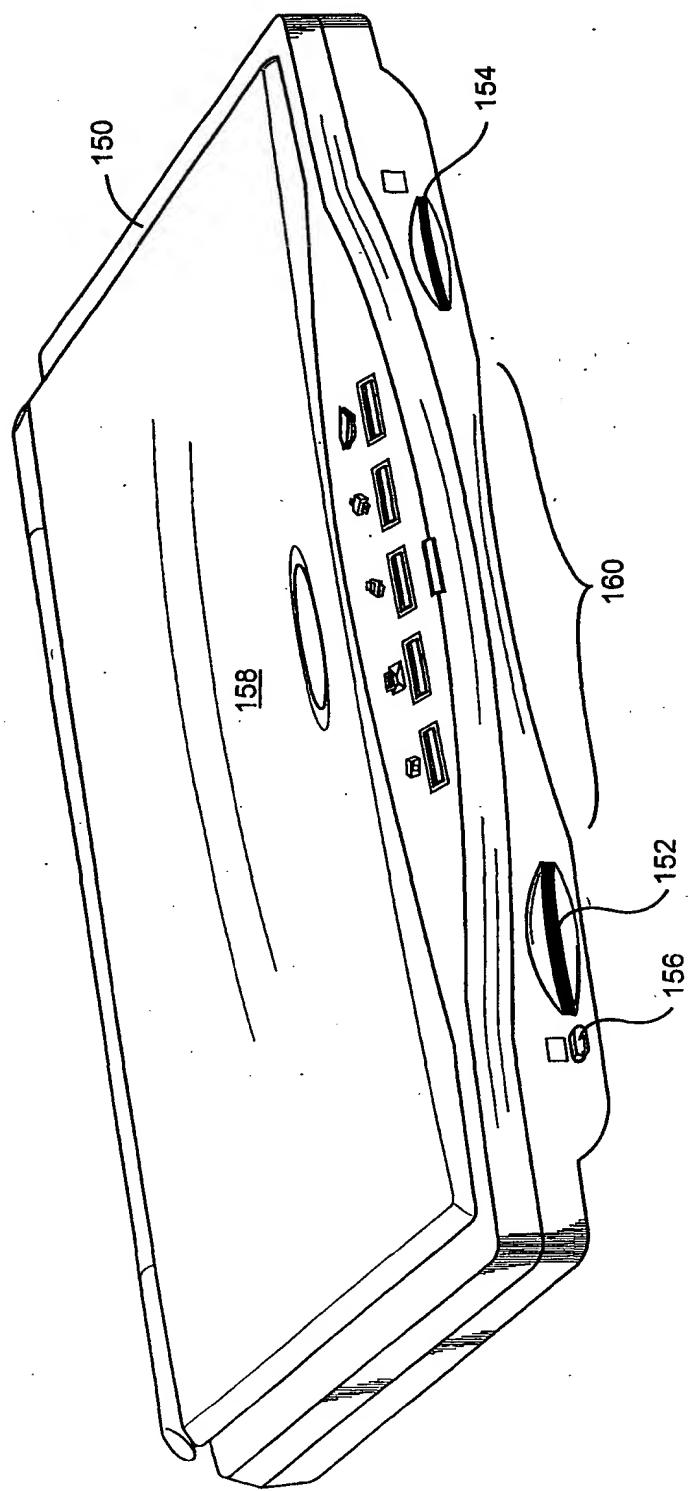


Figure 1A

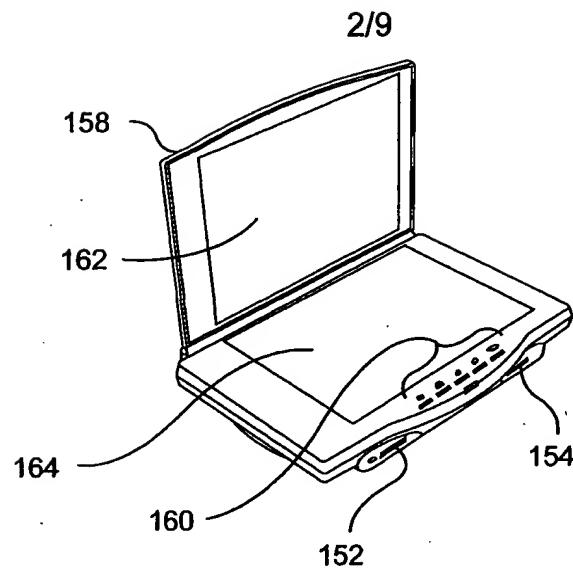


Figure 1B

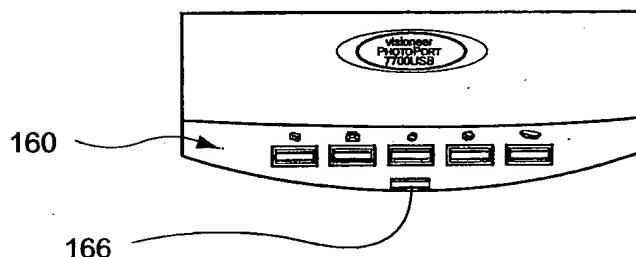


Figure 1C

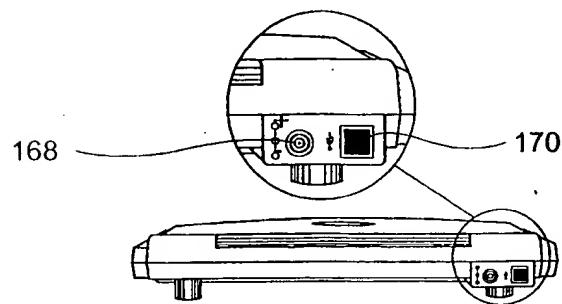


Figure 1D

3/9

Digital developer SW layout:
EVENT PROCESSING: CARD INSERTION

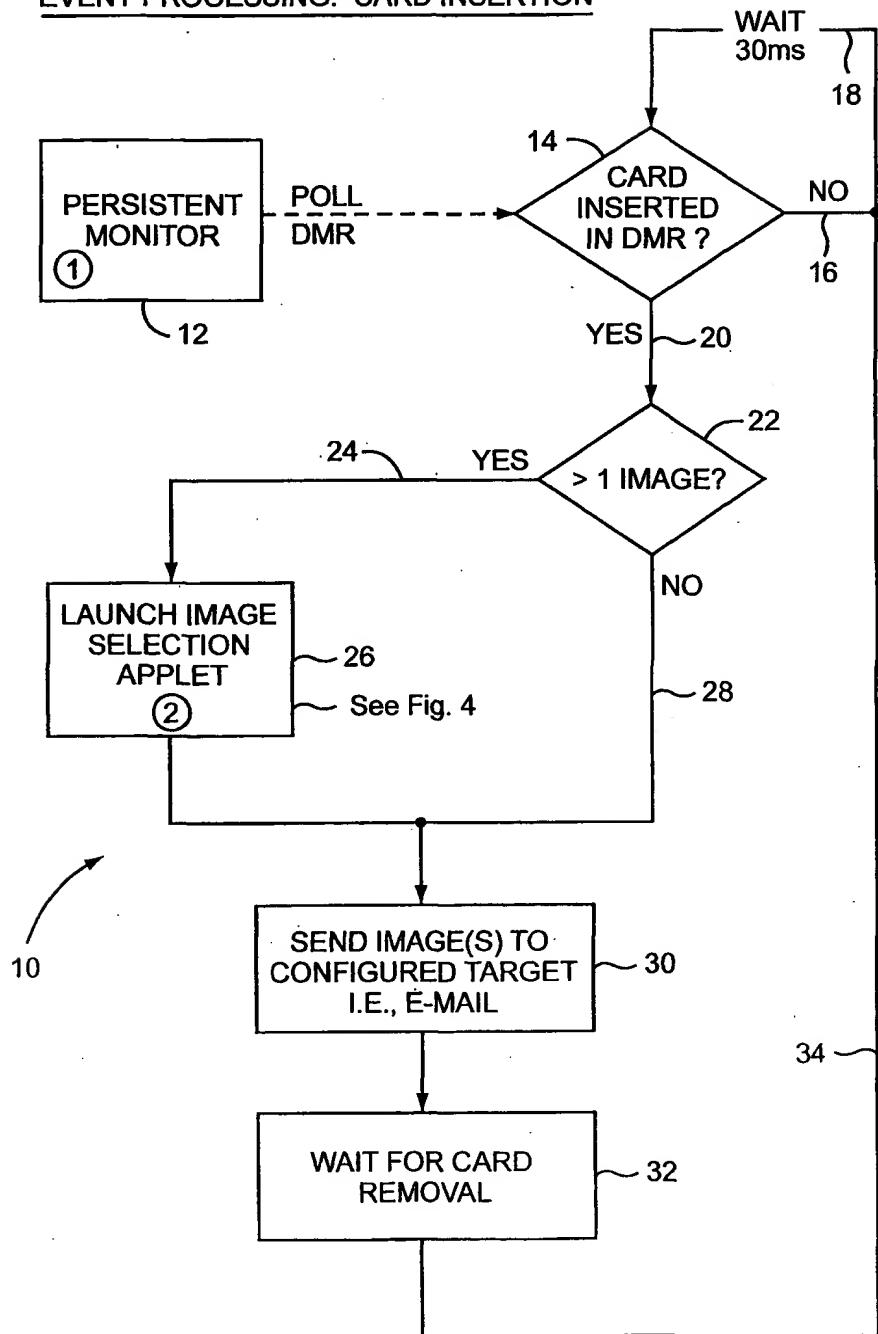


Figure 2

4/9

Digital developer SW layout:
EVENT PROCESSING: BUTTON PRESS

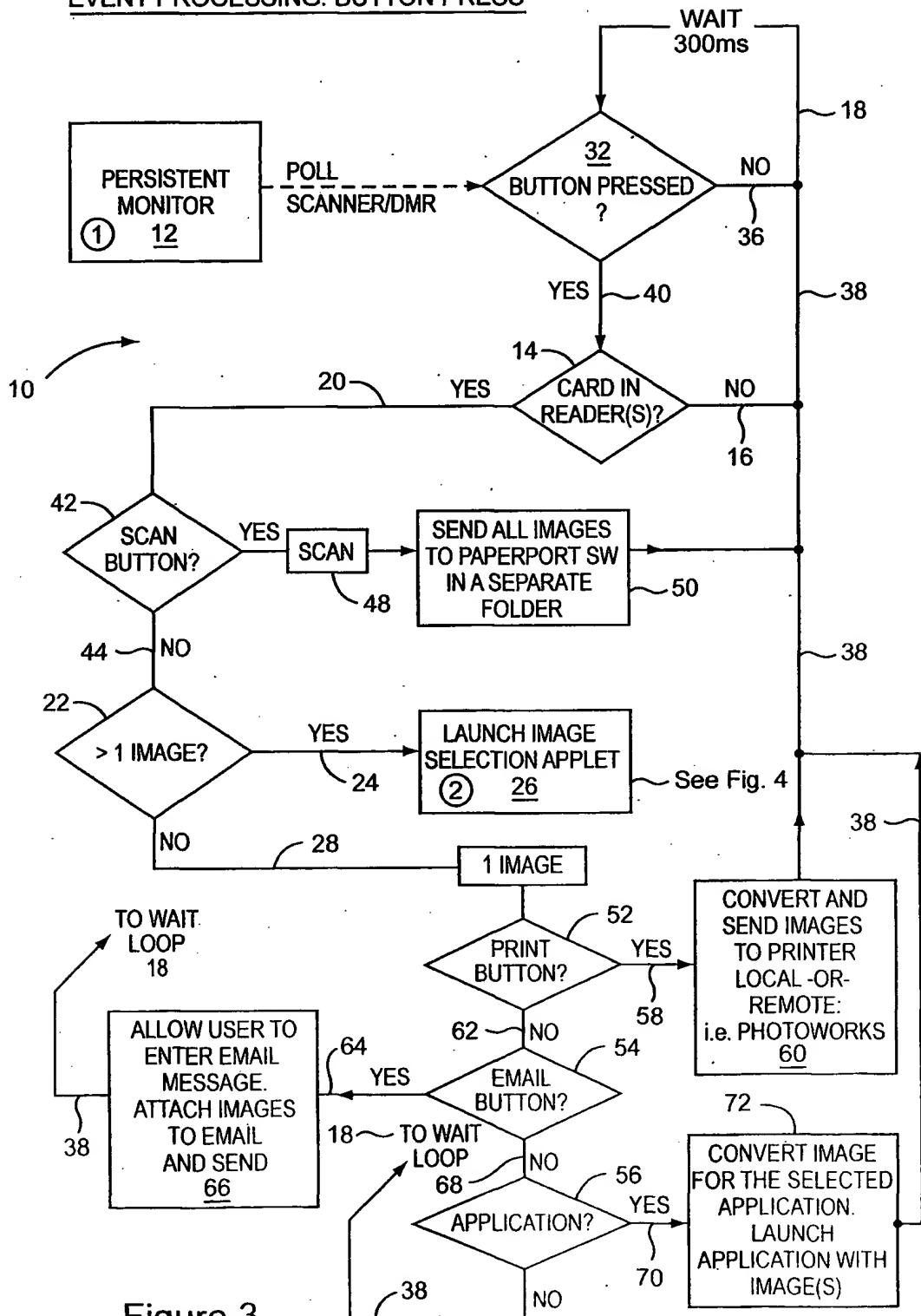


Figure 3

5/9

Digital developer SW layout:
COMPONENT ARCHITECTURE:

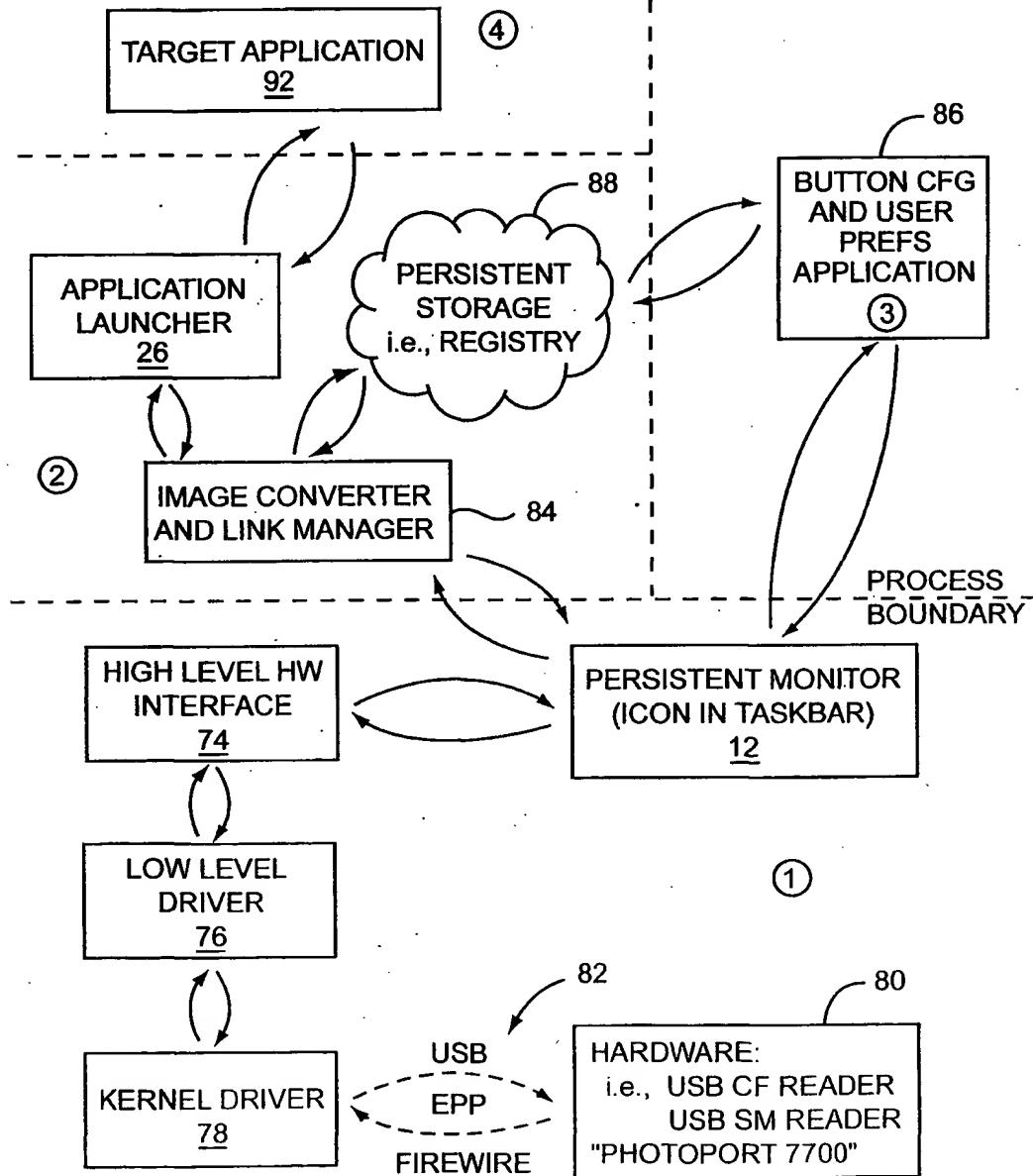


Figure 4

6/9

Digital developer SW layout:
**PHOTOWORKS LINK (REMOTE INTERNET PRINTING
 OR INTERNET IMAGE MANAGEMENT SERVICE)**

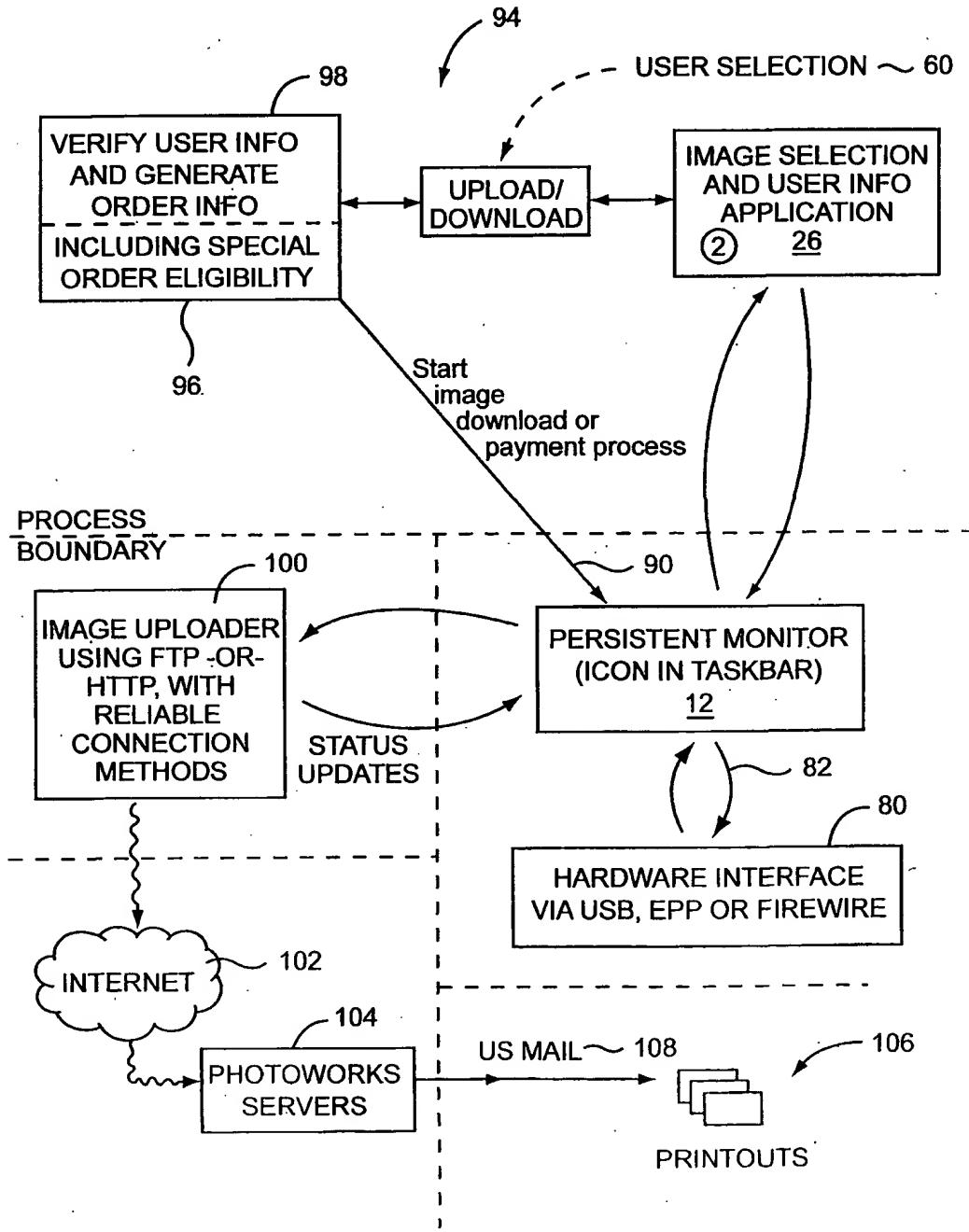


Figure 5

7/9

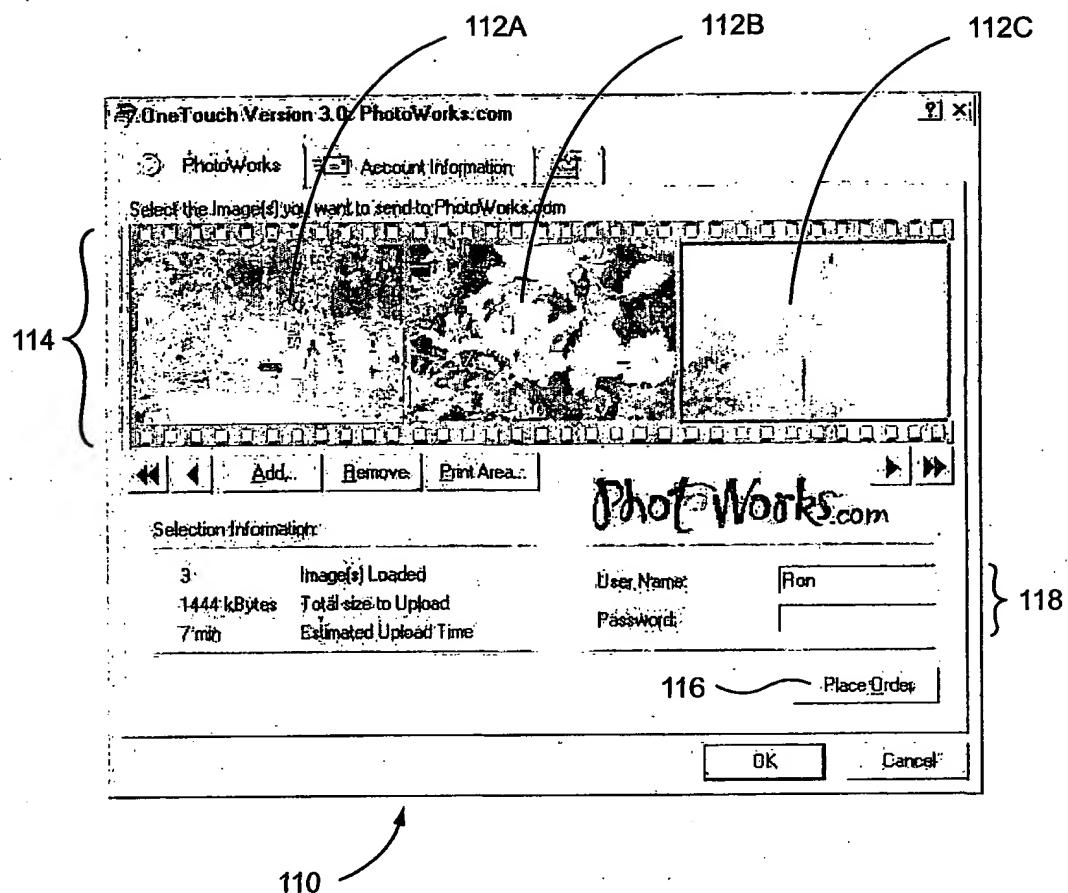


Figure 6

8/9

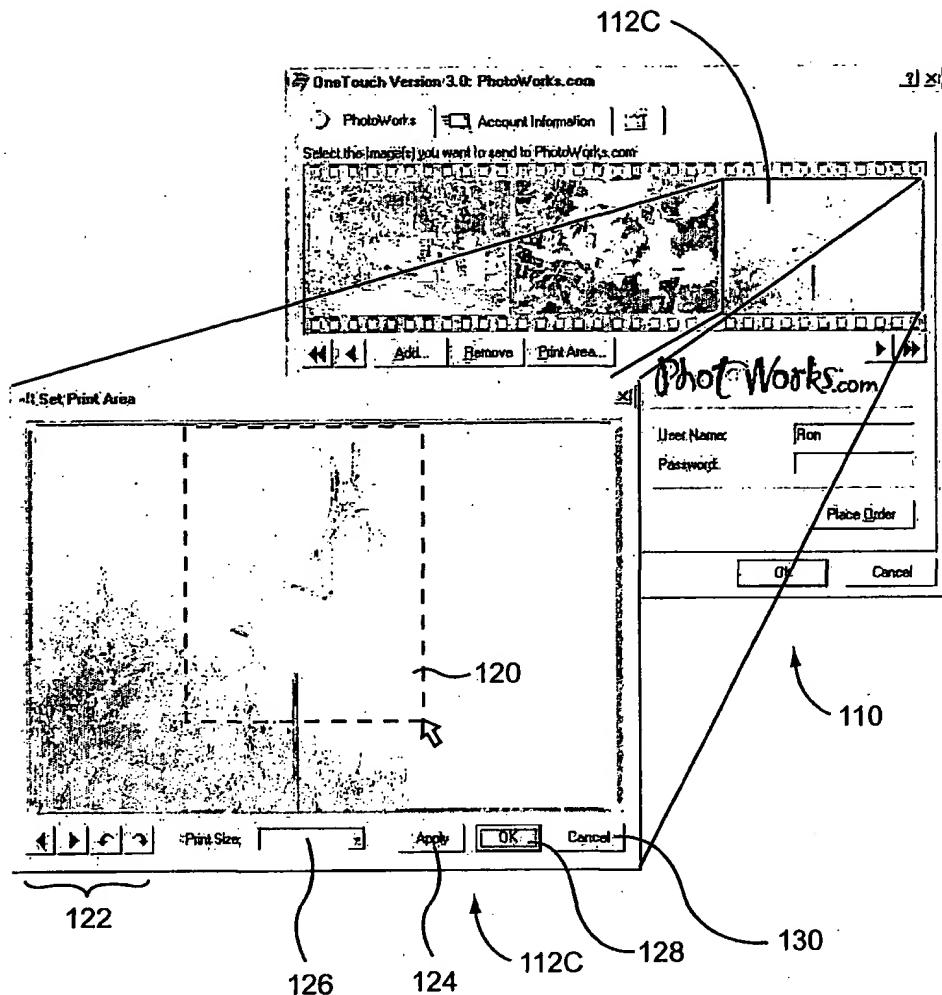


Figure 7

9/9

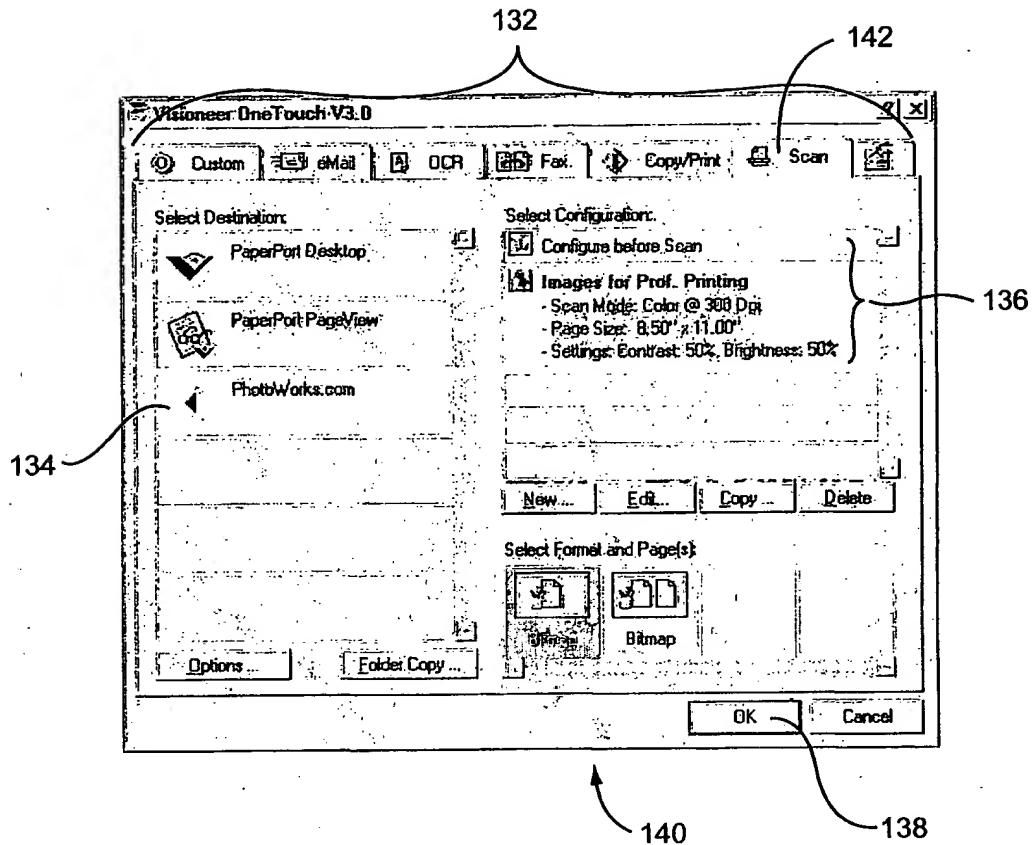


Figure 8